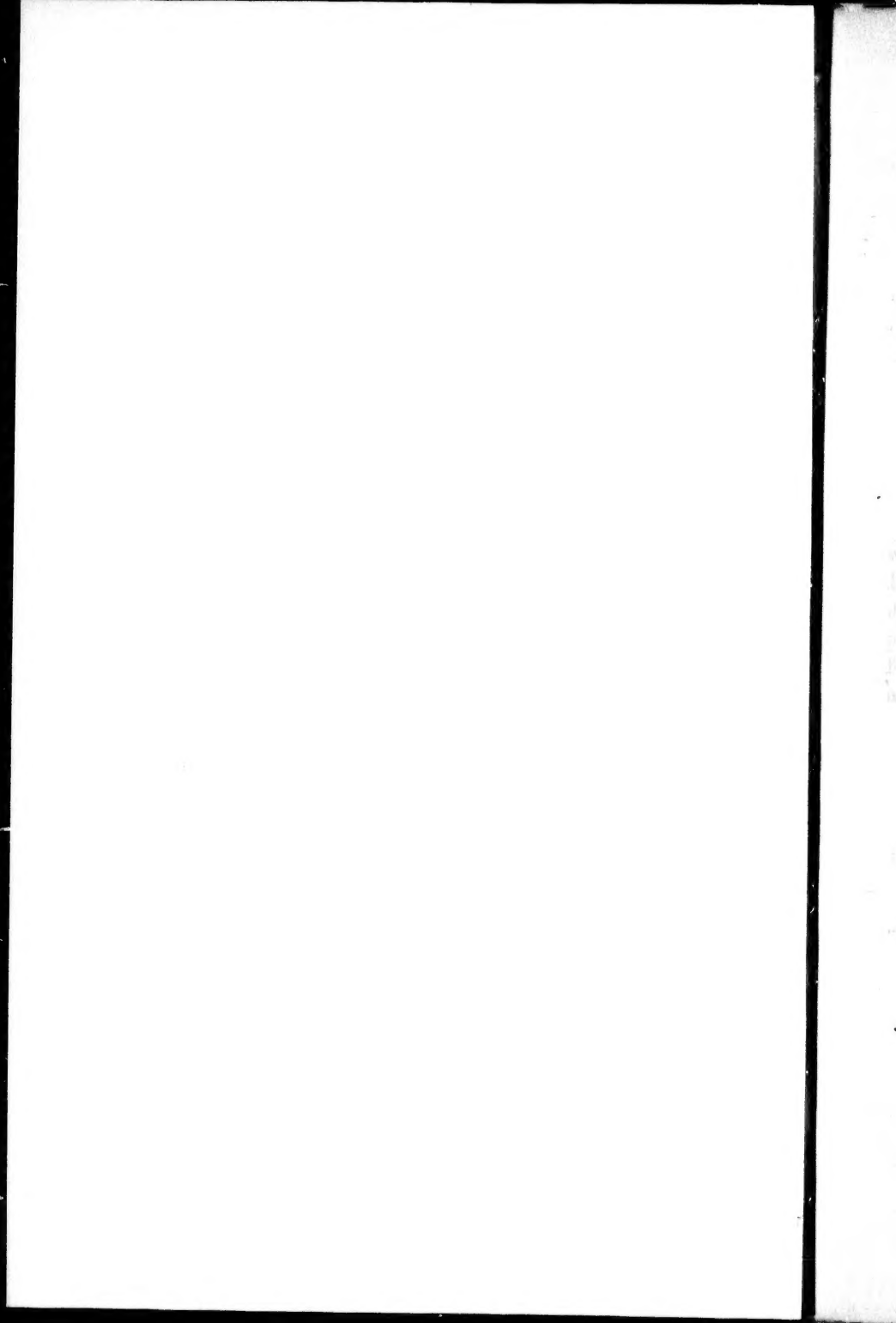




REPORTS

ON THE PROPOSED

LINE OF RAILWAY

BETWEEN

THE CITY OF SAINT JOHN

AND THE

HARBOUR OF SHEDIAC,

BY

J. WILKINSON, ESQUIRE.



Laid before the House of Assembly by command of His Excellency the Lieutenant Governor, and ordered to be Printed 4th March, 1850.

FREDERICTON:

J. SIMPSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY.

1850.

ON THE 23RD

LINE OF BELTWAY

THE CITY OF SAINT JOHN

HARBOR OF SHELTON.

[illegible]

E. B. ROBINSON JR.

U. S. AIR FORCE, WASHINGTON, D. C. 20330

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Fredericton, 4th February, 1850.

SIR,—After the service to the Saint John Water Company, for which my temporary absence was permitted, had been performed, I renewed my attention to the state of the Plans, &c., of the Saint John and Shediac Railway Survey, which had been left incomplete. They are now herewith submitted, with particulars specified in the Case in which they are enclosed, and also in the list annexed.

I have the honor to be, Sir,

Your most obedient Servant,

J. WILKINSON.

The Hon. J. R. Partelow, Provincial Secretary.

Frederick, 4th February, 1850.

SIR—After the service to the Saint John Water Company, for which my temporary absence was permitted, had been performed, I renewed my attention to the state of the Plans, &c., of the Saint John and Quebec Railway Survey, which had been left incomplete. They are now a fourth submitted, with particulars specified in the Case in which they are enclosed, and also in the list annexed.

I have the honor to be, Sir,

Your most obedient servant,

J. WILKINSON.

The Hon. R. Robinson, Provincial Secretary.

List of Plans, &c., of the Saint John and Shediac Railway Survey.

Bound Volume of reduced Plans and Sections.

Sheet, No. 1 to 12. Horizontal Scale, 50 chs. 1 inch. Vertical
Scale, 50 feet 1 inch.

Rough original Plans,—in Scale of 10 chas. to 1 inch.

Sheet No. 1. From Saint John to Davidson's Cove.

- " 2. " Davidson's Cove to Harris's Cove.
- " 3. Survey through Lakefield.
- " 4. From Harris's Cove to Hampton Ferry.
- " 5. " Hampton Ferry to late Toll Bridge.
- " 6. " Late Toll Bridge to 34th mile, near Finger Board.
- " 7. " 34th mile to Upper Boundary of Studholm Grant.
- " 8. " Upper Boundary of Studholm Grant, to Stone's Brook.
- " 9. " Stone's Brook to Vail's Meadow, Anagance.
- " 10. " Vail's Meadow to North River.
- " 11. " North River to Pitfield's.
- " 12. " Pitfield's to Jonathan Creek, near the Bend.
- " 13. Bend and vicinity.
- " 14. From Bend to Harris's Mill Pond.
- " 15. " Harris's Mill Pond to Shediac.
- " 16. Shediac Harbour.

Rough original Sections—Horizontal Scale, 10 chs. 1 inch. Vertical Scale, 40 feet 1 inch.

Sheet No. 1. From Saint John to Davidson's Cove.

- " 2. " Poverty Hall to Hammond River.
- " 3. " Hammond River to Acicack Marsh, including trial section through Lakefield.
- " 4. " Late Toll Bridge to 34th mile, near Finger Board.

*Nitkinson's Report
on the Shediac Rail
1850.*

Sheet No. 5. From Late Toll Bridge by route northward of Post Road to Finger Board, and thence to Studholm Church, near 40th mile.

- " 6. " Studholm Church to Stone's Brook, near 52nd mile.
- " 7. " Stone's Brook to opposite Hayward's Mills, near 64th mile.
- " 8. " 63rd to 75th mile, by route northward of Petitcodiac River.
- " 9. " 75th to 86th mile by same.
- " 10. " 86th to 99th mile by same.
- " 11. " 99th mile to Shediac.
- " 12. " 69th to 72nd mile on route recommended.
- " 13. Lines N 1 to 3, R 1 to 3, and Q 1 to 4, between Bend and Shediac.
- " 14. Line L on Babineau Marsh route, between Bend and Shediac.
- " 15. Line Q 1 to 4 northward of Village of Moncton.
- " 16. Cross Section between Bend and Shediac.
- " 17. Cross Section near Pittfield's.
- " 18. From 52nd to 59th mile, by route southward of M'Leod's Hill, or Portage route.
- " 19. South side of River Kennebecasis, near Studholm's Mill Stream.
- " 20. Reduced general Section. Hor. Scale, 2 miles 1 inch. Vert. Scale, 100 feet 1 inch.
- " 21. Reduced general Section. Hor. Scale, 50 chs. 1 inch. Vert. Scale, 50 feet 1 inch.
- " 22. Reduced general Plan and Sections. Hor. Scale, 2 miles 1 inch. Vert. Scale, 100 feet 1 inch.

Rough Original Field Notes.

Packet W, Books Nos. 1 to 14.

R, Levelling Books Nos. 1 to 39. Road Survey, &c., Books Nos. 1 to 14.

P, Books Nos. 1 to 20.

of Post
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CONCLUDING REPORT
ON
THE PROPOSED LINE OF RAILWAY

BETWEEN THE
CITY OF SAINT JOHN AND THE HARBOUR OF SHEDIAC.

Fredericton, 12th November, 1849.

SIR,—I regret that the labour connected with the late Survey of the proposed Line of Railway between Saint John and Shediac, should have been unavoidably protracted beyond my expectation.

§ 1. The duties of the Survey, both in the field and since, required exclusively my time and attention until the Plans and Sections were sufficiently completed. It then remained to examine in a more reliable manner, the general feasibility of the undertaking, the most advisable method of construction, and the probable cost.

§ 2. The Plans herewith submitted on the large scale, are the first rough drafts. The care which has been given to ensure the fidelity of these, will I trust entitle them to be copied in a manner adapted for preservation, in case that injury or loss should happen to any of the originals. I beg leave also to recommend the same with regard to the Sections. In the meantime the accompanying reduced copies have been made, for the greater facility of reference, and indeed to spare reference to the originals until copied.

§ 3. It is proper to state, that the series of small and sometimes partially detached triangulations by which the Survey has generally been verified, should be farther corrected by a series of large triangles between the extreme points. The country affords the means of obtaining these, but under the circumstances of the present Survey, nothing more could be done within one season than was indispensable to a sufficient knowledge of the ground. Anything beyond this, with the exception of that portion of the Line between Saint John and Hampton, was not attempted.

§ 4. By a reference to the Astronomical Observations under direction of Captain Owen, in the Bay of Fundy, and of Captain Bayfield, in the Gulf of Saint Lawrence, at the extreme points of this survey, their coincidence with the latter in geographical distance is so close, as to render very improbable the existence of any material error in one or the other.

§ 5. The uncertainty in the true relative position of almost all the grants from the Crown, had been too well understood in laborious, and frequently vain attempts, to reconcile them, not to give a collateral interest to this matter. Wherever opportunity occurred without unnecessary sacrifice of time, such boundaries have therefore been carefully noted.

§ 6. The following is a general summary of the lineal extent of the Survey, independently of the situations of objects approximately fixed, several hundreds in number, either by measured offsets or by triangulations :—

	Stations.	Miles.
Post Road between Hampton and Shediac,	509	89.262
Other Highways and Bye Roads connected with the Line,	1250	198.456
Lines surveyed and levelled, besides numerous lateral explorations not noted,	3172	167.603
Rivers, about		90.
Total,		545.321

§ 7. On the trial Sections of the line recommended, occur twenty two planes, the particulars of which are given in Tabular Statement, No. 1, appended, of which the following is a summary :—

	Miles.
Length of level line,	39.380
“ of gradients not exceeding 6 feet per mile,	22.800
and not exceeding 12 feet per mile,	25.910
“ 20 feet per mile,	3.591
“ 22 feet per mile,	11.931
“ 30 feet per mile,	3.977
Total,	107.589

These planes may be slightly varied, and even reduced in number by the final Survey. The ascending gradient of 30 feet per mile from Shediac, may undoubtedly, by further exploration, be reduced to the maximum of 22 feet per mile; or nearly to the equivalent, in working capacity, of a perfectly level line for the whole distance.

§ 8. The Tabular Statement, No. 2, appended, exhibits the details of the twenty six planes which would occur upon the more direct route along the table land, leaving the main line near the 68th mile from Saint John. It may be important for future reference, with a view to branch or intersecting lines. In the

meantime, it is an useful illustration of the deceptive character of that which is ordinarily regarded as flat and favourable looking ground, especially in the forest. Though the highest point in this Section of $37\frac{1}{2}$ miles, is only 181 feet above the tide at Saint John, yet such unfavourable gradients as 1 in 86, 1 in 67, and 1 in 98, must be encountered. A more favourable route between the Beud and Shediak, was obtained only by thorough exploration.

§ 9. The several tangents and curves recommended, are defined by the broad red line on the Plans, and which will be seen to vary, generally very slightly, from the principal trial lines on which it is based, and which are shewn in faint red. The distance estimated to be gained by these variations, is three-fourths of a mile, making the total distance from the head of the Mill-pond at Saint John, to Milner's Point at Shediak, $106\frac{1}{2}$ miles nearly. This is an increase of only $9\frac{1}{2}$ per cent. upon a straight line between these points.

§ 10. The Tabular Statement, No. 3, appended, exhibits the details of the tangents and curves, of which the following is a summary:—

Curve of least radius, (with the exception of one curve of 15 chains at a Station,) 30 chains.

Total curvature, $1923^{\circ} 40'$.

Extent of straight line, 77.546 miles.

Extent of curved line, 29.177 "

Total, 106.723 "

§ 11. There are a few points of variation from the general line for which this Table is formed, indicated upon the Plan by distinctly dotted lines, which may perhaps be adopted with advantage. Others, to a slight extent, may also prove to be advisable upon a due and final examination of the several Bridge sites, and other material points of the Line, which influence its general direction. Minute attention could not be given to these in every instance during the preliminary Survey, from the very uncertainty of their situation, which it was the object of such a Survey to remove. But, it is believed, that any necessary change will prove to be very slight.

§ 12. In estimating the probable cost of the work, regard has been paid—1. To the circumstances, including the climate of the country. 2. To the local peculiarities of the Line. 3. to the probable extent of traffic which may be anticipated for several years.

§ 13. It is recommended, in the first instance, to adopt a well designed and amply efficient structure, of the most durable descriptions of wood, resorting to no more excavations and masonry than may be necessary to open the Line with all convenient dispatch. This kind of structure is best suited to the resident labour of the country. Every settler of two years standing is generally master of his axe; and many have skill in the use of tools, which would render their aid valuable to the regular mechanic. Timber of the required description is still to be found in abundance; and saw mills occur at convenient intervals along the Line.

§ 14. The Road by such means being opened at the least necessary first outlay, the further cost of perfecting and completing the work in a thorough manner, will be greatly relieved; first, by the use of the Road itself, in the transportation of materials, and of the persons engaged in the construction; and again, by the revenue arising from the traffic in the meantime going on.

§ 15. The more prominent advantages of this method may be thus enumerated:—1. Great saving of time and labour in the disposition of the material of the *first* necessary excavations. 2. The free passage for water without the immediate necessity of a large proportion of the masonry, for bridges and culverts. 3. On flat alluvial land the framing, in many instances, permits the use of the soil, and the passage of cattle beneath the track; thereby, for the present, saving occupation, roads, and passes. 4. The immediate use of the Road after construction, without the delay necessary for settlement and subsidence, as with earthwork. 5. The facility of subsequent and perfect embankment by degrees, including the transportation of materials for the bridges and culverts, at half the ordinary cost, and with means to a great extent provided by the business of the Road. 6. Embankments made in this manner have ample time to consolidate before it may be necessary to subject them to the traffic. 7. The wooden structure is not liable to disturbance by intense frost and sudden thaws, or by heavy rains and floods, like earthwork; and consequently less liable to cause interruptions to the traffic; and is less expensive to keep in repair. 8. The working expenses generally, upon an efficient wooden structure, are found to be less than upon earthwork, during the period necessary for consolidation, which is sometimes several years. 9. The line of way is so fixed and defined as to ensure mechanical precision and economy in the disposition of the material in embankment. 10. The preparation of the wood structure may be proceeding during the winter, when earthwork is impracticable. 11. On marshy or low ground, liable to be overflowed, the construction may be forwarded during the winter, by

driving piles, using the ice as a platform, with greater facility than in summer, and where earthwork would at all seasons be of doubtful expediency. 12. It is not, in this manner, necessary to execute the earthwork in great haste, involving the necessity of bringing together large bodies of men, inordinately raising the price of labour, increasing the cost, rendering proper supervision more difficult, and the embankments less reliable when executed, and more expensive to keep in repair.

§ 16. The earthwork to be encountered is comparatively light in amount. The maximum depth to a small extent only of either cutting or embankment will not exceed 30 feet. The prevailing depth where earthwork is necessary, will range below 15 feet. The lineal extent of each description of road formation as exhibited in Tabular Statement, Appendix No. 4, is approximately as follows:—

	Miles.
In excavation	38.076
On embankment	37.257
On piles... ..	29.719
Bridging	1.671
Total	106.723

§ 17. In the estimate herewith submitted, Appendix No. 5, the several quantities are of necessity derived from the preliminary survey. The alterations which may be made, will generally reduce them. The average scale of prices assumed is such as was considered a fair one in the neighbouring States, when labour was higher than at present. No allowance has been made for the preservation of the wood. Before it can be much affected by decay it is assumed that it will be supplanted by earthwork; and that altered circumstances and increased traffic will demand alterations and improvements. These would probably not affect the more expensive buildings and bridges, which should be subjected to a preservative process; and such a one, if practicable, as would also afford security from fire.

SUPERSTRUCTURE.

§ 18. On the gradients of this Line of Railway, light engines will be equal to the heaviest traffic that can reasonably be expected. The wear and tear will be small in proportion. Differing views, and as yet unsettled practice, prevail as to the plan of superstructure. This question has involved one of the heaviest items of expense, both originally and in subsequent repairs. One acknowledged cause of this has been in unfairly subjecting the several

forms of permanent way, designed for light engines at a moderate speed, to the destructive force of very heavy ones at a high velocity.

§ 19. It may be observed that the tendency of the latest and most improved changes, is, in effect, to confirm the principle of the simple flat form of rail on a continuous timber support, as at first adopted in America; but with a wider transverse bearing. The low and broad flanged $\perp$ and Bridge Rails, as adopted respectively on the London and Croydon and Great Western Railways, on continuous timber bearings, will be seen to differ more essentially in form, than in substantial strength, from a rectangular or flat rail of equivalent section applied as in the diagram annexed; whilst the latter has obviously the advantage both in stability and simplicity.

§ 20. The relative first cost in New Brunswick of wood and iron of equal transverse strength, cannot be stated at less than 30 to 1. At this rate the interest on the cost of the iron, would renew the wood, at least once in every year.

§ 21. It is most probable that time and experience will only more conclusively shew that the proper office of the iron is chiefly to resist abrasion; and of the continuous wooden bearing, to sustain the strain; and that the form of greatest stability to the metal is of more importance than that of the greatest vertical strength. On this principle of application, a rail of less than 30 lb per yard is sufficient. This is double the weight at first successfully adopted for light traffic on some of the American Railways. On some of those recently designed in the West, the flat section continues to be adopted. On others, after long experience, it is still maintained; but generally a disposition prevails to substitute the edge form. Failure may be expected with regard to any form subjected to more violent usage than its proportions and mode of application are adapted to bear.

§ 22. It is certain, as a principle, that the greater the elevation of the rail the greater must be the effect of the oscillation of the locomotives and carriages; which has long been regarded as a material, if not a main cause of the destruction of the permanent way.

"It will not be disputed," remarks a late author in a professional notice of this subject,* "that the lower the rail can be kept down the more stability it must have; whereas the carriage wheels, being now raised some inches clear of the base, there is the certainty of more oscillation, or rocking of the carriages taking place."

§ 23. An acknowledged criterion of the relative value of railway property, is a low proportion of the working expenses to the gross

* "Railways" by R. Ritchie, F.R.S., S.A., Civil Engineer, &c., p. 83.

income. That proportion can generally be known only from the usual published official statements.

§ 24. The statements A and B appended to the preliminary part of this Report,* were transcribed from another Report, in which their object was to shew the generally profitable results of railway investment, without particular reference to the manner of construction. They are no doubt derived from the best sources. In Statement A are comprised six principal Railways in the State of New York, constructed at an average expense of £5,649 per mile, with the *plate rail*. The mean ratio of the working expenses to the receipts, on these six lines, in the year 1845, is shewn to be 37.8 per cent, with a profit of 10 per cent. upon the cost.

In statement B are comprised nine of the best constructed Railways in New England, at an average expense of £9,788 per mile, with an *H rail*, varying in weight from 55 to 63 per yard. The mean ratio of the working expenses to the receipts, on these nine lines in the same year, is shewn to be 47.74 per cent., with a mean profit of 7.44 per cent. upon the cost.

In the aggregate of these examples, therefore, the working expenses are 26 per cent., and the divisible profits 34.4 per cent., in favour of the *plate rail*.

The mean comparative results of similar statements of the same Railways for subsequent years do not materially differ from the preceding.

§ 25. In the estimate herewith submitted, the item of £1500 per mile for superstructure, includes an average allowance for the preparatory wooden structure throughout the line, exclusive of bridges. The sum is composed of—

Average cost of materials, including necessary iron,	£560
Workmanship,	300
Iron Rails of 30lbs. per yard, and necessary end plates,	
48 tons at £10 per ton,	480
Spikes for fastening,	20
Miscellaneous labour,	140
Total,	£1500

COST OF CONSTRUCTION.

§ 26. For more convenient general reference, the line is divided into nine Sections. Section 1, from 1st to 9th mile, includes the cost of the terminus at Saint John, and of the intersection of the

* Reprinted, Appendix No. 7.

ridge of limestone at the fifth mile. The estimate for the latter, is for an open cutting close to the present highway. The cost at this point, can be materially diminished only by adopting for a short distance a much steeper gradient than is necessary on any other part of the line. The shortest tunnel that could be conveniently substituted, would be about 700 yards in length, at an additional cost of about £12,000. This however being the only difficulty, if it can be so called, which occurs in the whole line, it may justly be regarded as insignificant. It is also much more than balanced by the close proximity and value of the material of the rock, which cannot fail to contribute largely to the business of the road for an indefinite period of time. The average cost of this Section is £5,926 10 5 per mile.

Section 2, from 10th to 18th mile, includes the cost of bridging Henderson's and Harris's Coves, and Hammond River. The average cost per mile is £4,785 12 1.

Section 3, from 19th to 28th mile, though including a large item for the Bridge at Groom's Cove, is not otherwise expensive. Average cost £2,886 18 11 per mile.

Section 4, from 29th to 41st mile. Average cost £3,945 5 9 per mile.

Section 5, from 42nd to 53rd mile. Average cost £2,647 13 7 per mile.

Section 6, from 54th to 63rd mile. Average cost £3,120 14 2 per mile.

Section 7, from 64th to 71st mile. Average cost £3,253 10 3 per mile.

Section 8, extends from 72nd mile to Bend of Petitcodiac, distance 19 miles. The earthwork upon this Section is estimated upon the highest average of other portions of the line. Without a previous Survey of the River, a line could not have been selected and levelled with any useful result, even if time had permitted.

The two last and most expensive of the Bridges which occur between the 78th and 79th miles, may be avoided by submitting to a curvature corresponding nearly with that of the abrupt bend of the River, which the Bridges are intended to cut off. The sloop navigation terminates at this bend. No practical difficulty is likely to occur on this Section. After crossing Jonathan Creek, the line may proceed more directly towards Shediac, north of the Village of Moncton, as indicated in the Plan, and of which route a Section was made. This would be preferable to the continuous route by the latter, as also shewn on the Plan, after the whole line may be

opened. In the meantime, a direct communication between the Harbour at the Bend, and that at Shediac, would be necessary. Average cost per mile, £4,101 7 10.

§ 27. Section 9, from the Bend to Shediac, distance 16.723 miles, embraces no unusually heavy item of expense. The Road and buildings would cost £65,000, and in order to open the same for separate traffic, about £10,000 should be added for the running stock.* Exclusive of this item, the average cost would be £3,898 13 11 per mile.

§ 28. The idea of converting this communication between the Bay of Fundy and the Gulf of Saint Lawrence into a marine railway, for the transportation of vessels and their cargoes from one tide to the other, is worthy of mature consideration. There can be no doubt of the feasibility of such a project for vessels of moderate tonnage. It would thus, in fulfilling the purpose of a railway, accomplish also the advantages proposed by a canal.

The works would require to be constructed in a stronger manner than for ordinary railway traffic, and at least a double line of rails, with sufficient sidings, would in the first instance be necessary. The cost would probably be increased one half.

It would be a point for consideration, whether the route would be so generally preferred by the ordinary steam and sailing craft, and especially by fishermen, as would warrant such additional outlay.

The ordinary working cost of their transportation on the gradients of this line would be nearly equal to the cost on a level; the increase of power necessary to overcome the ascent in each direction being again nearly compensated by the force of gravity in the opposite descent.

The minimum cost in certain instances of Railway transportation is not applicable. In this case, it could not be stated so low as that on Roads designed chiefly for a descending traffic of steady and unlimited amount, like the mineral traffic on the Stockton and Darlington Road in England, or the Philadelphia and Reading in America.

Also assuming that the transportation were steadily maintained at a full working amount during the summer, the running stock must necessarily be idle, or very partially employed, during the winter.

The saving to vessels would be in the time, risk, and expense of the circuitous voyage round the Coast of Nova Scotia. The existence of such an advantage, in the voyage to any part of the

* This amount differs little from the cost assumed in preliminary Report, vide § 25, Appendix No. 7.

Gulf or River Saint Lawrence, would no doubt, lead generally to its preference at a reasonable charge, and thus a greatly increased intercourse would be promoted between the Ports of both sides of the Bay of Fundy, and those of Canada. On this ground it would have strong claims to Legislative consideration, independently of any speculative views of immediate profit.

Perhaps the lowest rate of charge which could at present be safely named, as that at which such a work could be maintained in a state of efficiency, would be one shilling and six pence per ton upon every vessel for the whole distance.

§ 29. Nothing has been estimated for damages to land, as this charge will necessarily be contingent upon the liberality of individuals. In Canada, and in the United States, the proprietors of land have very extensively given the right of way; justly regarding the advantage as much greater than the sacrifice. Generally, a no less liberal spirit may be expected, as in fact has already been evinced, in this Province.

It is desirable that an ample space of ground should be secured at each of the principal Stations. Much inconvenience and extra expense have been experienced from under-estimating this item. No locality for Stations in any instance, has been indicated on the Plans, as the precise situations may be determined by various considerations.

§ 30. The total estimated cost is £435,918 including the necessary running stock for the effective working of the whole line. The earthwork included, is however for a 24 feet base in excavation, or sufficient for a double track when required. For a single line the whole of this expense is therefore not immediately necessary.

PROSPECTIVE REVENUE.

§ 31. With regard to the amount of revenue which should be realized in order to render the above sum a safe investment, the ample experience of Railways has supplied a rule of judgment. The true relative proportions, which the working expenses and the interest on the cost, bear to the gross revenue, obviously afford the only safe criterion of the value of Railway property. Such proportions are ordinarily derived from the published abstracts of Railway Accounts, recognised as official and authentic. The examples to which reference has just been made, (§ 24) afford the necessary illustration, and may again be employed to show the relative security which the plate and edge rail constructions hold out for interest on the investment.

§ 32. Of the six examples of the Plate Rail superstructure, 37.8 per cent. is the mean, and 44.41 per cent. the extreme proportion

of the working expenses to the receipts. With a view to security the latter will be the proper guide. Upon this datum the necessary revenue, may be thus computed:—

Interest on total cost of £435,918 at 6 per cent.,	£26,155
Highest proportion of working expenses to gross revenue, 45 per cent.	21,400
Largest revenue necessary to pay interest and working expenses,	£47,555

Of the nine examples of the heavy or edge rail superstructure, 47.75 is the mean, and 54.43 the extreme proportion of the working expenses to the receipts. Guided by the same rule as before, the necessary revenue may be thus computed:—

To the total cost of construction by first plan,	£435,918
Add additional cost, say of 56 $\frac{1}{2}$ rail, 114 miles, including sidings, at £500 per mile,	57,000
Total cost,	£492,918

To interest at 6 per cent.,	£29,575
Add the highest proportion of working expenses to gross revenue, 54 per cent.,	34,718

Largest revenue necessary to pay interest and working expenses,
£64,293
 or 35 per cent. in favour of the plate rail.

§ 33. Both examples of Railway construction referred to, are regarded as respectively the best of their class. The results represent a large amount of varied experience in each case in a climate, and under circumstances, not very dissimilar to those of the southern portion of this Province:

The extreme revenue which that experience exhibits as necessary to secure interest of the investment in the plan of construction proposed, is £47,555. It remains to be ascertained whether a reasonable prospect exists of the realization of this income.

§ 34. In the abstract of the registration of the number of passengers during three months at six Stations in the Province, appended (C) to the preliminary part of this Report, are included the number at two Stations on the line between Saint John and Shediac, shewing the annual number estimated at the same rate to be:—

At Hammond River,	23,368
At the Bend of Petitoodiac,	87,700
Total,	111,068
Mean,	55,534

Regarding these numbers as derived from a faithful registration at points upwards of 70 miles apart, they must nevertheless fall short of the truth by the large number of travellers entering or leaving the main road, on either hand, before approaching those points. / So far as these numbers might tend to affect confidence in the prospect of revenue, nothing would be more desirable than a repetition of the registration at a more favourable season of the year.

§ 35. One mode of viewing the relation of these statistics to prospective revenue, is by comparing the same with the statistical returns of such Railway in actual operation, as may afford a fair example of passenger traffic; say of the Western Railroad in Massachusetts.

The average yearly number of *through* passengers on this Railway during the five years from 1842 to 1846 inclusive, was 23,704; and of *way* passengers 196,487. The latter is the accumulated number taken up at the Stations between the termini, however short the distance travelled.

There are 34 Stations in the distance of 156 miles between Worcester and Albany. The fare through has varied from six dollars downwards. An approximate mean may be taken at five dollars. At this rate, the revenue for 23,704 through passengers would be 118,520 dollars. The average income from all passengers for the five years is 331,379 dollars per annum, showing the proportion of 202,859 dollars as derived from way passengers. This sum divided by five dollars should therefore approximate to the number of through passengers to which the way passengers would be equivalent. This number is 42,572, or about $4\frac{1}{2}$ to 1. The distance through, 156 miles, divided by $4\frac{1}{2}$, gives about $34\frac{1}{2}$ miles as the average distance travelled by each way passenger. (Appendix No. 6.)

§ 36. Now it is exceedingly improbable that any considerable number of the travellers at either of the points of registration between Saint John and Shediac, were travelling a greater average distance than $34\frac{1}{2}$ miles on the same day. In order therefore fairly to represent the way traffic on the whole distance, at least one

intermediate Station should have been registered. This would have fallen in Sussex Vale, the centre of the best settled portion of the line. A registration at that place would no doubt have shewn a considerably greater number, than that at Hammond River, and perhaps less than that at the Bend. It will be reasonable to assume that it would not have been less than a mean of the two, or 55,534.

This number may be taken as a third registration, in order to represent nearly the whole way traffic, according to an average experience of five years on the Western Railway; thus

At Hammond River,	...	...	...	23,368
At Sussex Vale, (mean,)	...	...	...	55,534
At Bend of Petitcodiac,	...	...	...	87,700

Total of way passengers,	166,602
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The present number of through passengers, by stage or otherwise, is so small, that it may be merged in this reckoning.

§ 37. Viewing the amount of *way* traffic with respect to the extent of country traversed, it is, as compared with that of the Western Railway, as follows:—

For the number of 196,487 way passengers in a distance of 156 miles, the proportion for 107 miles is 134,770. But by the above computation, the number who travel within the latter extent *without a railway* is already 166,602, or 23 per cent. greater than on the principal Railway in Massachusetts.

We could, therefore, afford to take the registration at Sussex Vale to be even lower than that at Hammond River, and yet shew a way traffic equal to that of the Western Railway.

This fact alone is sufficient to remove doubt on the question of prospective revenue. It shews that the time for the establishment of a Railway in this line of country is not yet to come, but that it has long since arrived.

§ 38. At present there is no reliable index to the future through traffic. The facility is wanting to promote any other intercourse than chiefly that which is demanded by necessity. But a mere glance at the Map is demonstrative that Saint John is the natural *winter* outlet of much the largest division of the Province, without a reasonable prospect of competition. It is the interest of at least that extent of country that such an outlet should be easily accessible. Also in proportion to the enterprise employed will a participation be ensured in all other trade which may incline to the Bay of Fundy.

An arterial Line of Railway, nearly equivalent in its gradients to a level Line, connecting such a Port, by the nearest route, with the navigation of the Gulf and River Saint Lawrence, cannot fail to command a large through traffic. It would be unjust to estimate it less favourably than warranted by the existing way traffic.

§ 39. For 196,487 way passengers there are 23,704 through, on the Western Railway. The same proportion for 166,602 would be 20,098.

The prospective through traffic, thus estimated, would therefore be equal to	...	...	...	...	...	20,098
Added to 166,602 ÷ 4.5,	...	...	...	...	...	37,022
Making a total of	...	...	...	...	...	57,120

This number, at the moderate fare of 20s. for the whole distance, would yield a revenue of £57,120, or exceeding by 20 per cent. that which has been shewn to be the largest necessary to secure 6 per cent. interest on the investment.

In this estimate no increase of traffic has been assumed. It is contrary to experience and probability that it will not increase. The mere construction of the Railway will largely increase it.

§ 40. No allowance has been made for the conveyance of the Mails, and nothing has been estimated for freight. These important sources of revenue remain in reserve, which cannot be expected to yield less than one half, in addition to that which is already more than sufficient. Experience has, however, sufficiently shewn that increase of revenue beyond a certain limit can be secured only by increase of expense. It is sufficient, for the present, to shew that for the limit of expenditure proposed there is an adequate assurance of revenue. It is believed that this has been shewn with a scrupulous inclination to security. As a rule, in ordinary cases, it would be exceedingly unjust to say that you must first shew that the way traffic of your common Road is already equal to that of an established first class Railway, before it can be admitted that the introduction of a Railway would be successful. It is not in this case necessary to shrink from the severity of such a test.

§ 41. So far the subject has been considered chiefly with reference to existing circumstances and to immediate profit. But a few additional observations are due to prospective results. These cannot but be important to a degree, which it would be difficult to over-estimate, to every interest affected.

§ 42. First, with regard to Agriculture. The advantages of the Railway as a greatly improved medium of communication between

the producer and consumer, or between town and country, and between one part of the country and another, for the interchange of commodities, and for social intercourse, would obviously be great. But it is doubtful whether such advantages would equal in eventual importance, those which would be derived by Agriculture as an art.

It is well understood, that in conjunction with draining, the judicious and liberal application of the proper kinds of manure, is the chief reliable method of increasing and maintaining the fertility of the soil. Amongst the most useful and indispensable of such applications, is Lime; the chief cost of which to the farmer, is generally that of transportation.

§ 43. To the comparative absence of this material in the soil, perhaps, as much as to any other cause, may be ascribed the common failure of the wheat crop during late years in some parts of the Province. This crop was formerly certain and abundant in the Valley of the Kennebecasis. It was not sufficient merely for the producers, but a large surplus was annually sent to market, in appearance and quality surpassing the best description imported. The soil now refuses to bring this crop to maturity, just as it is found to do in the older parts of the United States, where similar exhaustion has taken place. In a course of Lectures on the application of Chemistry to the useful arts, by Professor Renwick, the cause is thus noticed: "The seeds of the cereal gramina all contain lime in combination with acids. Their stalks also contain it, but in less proportion. *Wheat is the grain which contains most of this earth.* Hence none of the valuable vegetables will flourish except on soils which contain lime; and some soils which are fertile in grass may be incapable of bearing grain; or those which yield a tolerable product of the less valuable grains, may *refuse to bear wheat.* As the lime enters into the constitution of the plants, the calcareous matter of the soil will be gradually exhausted, and hence it has been found, that even under careful management, wheat has gradually ceased to be a profitable crop in the older parts of the United States."

§ 44. Limestone exists in abundance in the vicinity of Saint John; at one point it forms the only real obstacle to the Railway. It is there piled by nature as it were upon the track. The farmers of the interior, where it is generally absent, will by aid of this work receive it at the smallest possible cost. The inducement to avail themselves of the advantage, both on private and public grounds, is supplied by a reference to the list of Provincial Imports. By this it is found that in the year 1847, the quantity of wheat, and of flour reduced to its equivalent in wheat, imported, was equal to about 626,000 bushels; besides large quantities of other grain and meal, amounting to the estimated value of about £280,000 currency.

The above quantity of wheat, at the rate of 20 bushels to an acre, the minimum return under a good system of cultivation, should be produced on one twentieth part of the land, within five miles on either side of a Railway between Saint John and Shediac.

§ 45. Any attempt to accomplish such a result all at once, under present circumstances, would be futile ; and it is not too much to say, that the attempt is not likely to be successfully made at all, within any assignable period, without the aid of a Railway. The greatest distance to which lime is conveyed for agricultural purposes by common roads, is from eight to twelve miles, and this necessarily at great expense. The quantity of lime applied in a proper manner, necessary to the production of the above quantity of wheat, would not fall short of 30,000 tons per annum. This amount of transportation is however with reference to a solitary item.

§ 46. The important part which Railways may have to perform under an improved system of agriculture, is illustrated by the example of the Eastern Counties Railway in England ; which has at least a dozen gigantic competitors terminating in or near the metropolis. The following is a list* of articles transported on this Railway in one week of September, 1848 :—

Beasts,	529	Poultry—tons,	37
Calves,	73	Fish—tons,	332
Sheep,	5,598	Fruit & Vegetables—tons,	643
Pigs,	865	Beer—tons,	229
Grain & Malt—sacks,	17,711	Wine & Spirits—tons,	73
Flour—sacks	6,578	Milk—quarts,... ..	19,608
Meal—tons,	197	Bread—cwt.,	59

§ 47. A demand for Railway transportation will be created by the materials and products connected with mechanical and other labour,—as building-stone, gypsum, limestone, lime, sand, bricks, slate, iron, charcoal, ashes, ship timber, spars, lumber, firewood, household furniture, machinery, hardware, implements and tools of all kinds. These, with numerous other things of lesser importance, will tend to make a large aggregate of freight.

§ 48. The close proximity of the Line of Railway to many valuable but now neglected Salt Springs, will supply all that seems to be needed in order to bring these into extensive and profitable conversion, and thus to create another material source of revenue.

§ 49. The extent of benefit which the Railway may be calculated to afford to that most important interest, the Gulf Fishery, and to

* Companion to British Almanac, 1849, p. 103.

receive from the same in return, will be best understood upon a full statistical knowledge of the whole subject. In the meantime it is obvious that all available markets are sealed to the resident fisherman during six months of the year. He must either force the produce of his enterprise upon those markets at once, or reserve the same at all hazards during the remaining period. There can be no discretionary regulation of supply to demand. Excluded from such an advantage, there can be little inducement to embark in this Fishery on a large scale. But connected by means of a Railway with the constantly open Harbour of Saint John, this business will enjoy facilities, by aid of which, it may be expected, on an average of years, to become highly prosperous, and to take its just place in the scale of Provincial interests. A valuable and numerous class of men, habituated to maritime life during the summer, will thus be in readiness for the wider field of honorable employment to which they will be invited in winter. During this season the necessities as well as the advantages of the local position of the Province, will direct commercial enterprise to other climates and to distant coasts.

The nursery of seamen which the Fisheries thus offer, to re-place that which must necessarily decline with the lumber trade, will reassure the maritime growth of the Province on a firmer and more permanent foundation.

§ 50. Amongst other prospective sources of revenue, that of the eventual introduction of manufactures cannot be excluded. This is, to some extent, but not wholly, contingent upon the successful improvement of local agriculture.

The condition of the manufacturing system both of Great Britain and of the Eastern States of the American Union is, to a great extent, that of dependence upon food drawn from remote countries. The cost of transportation of this food, is a premium to the local cultivator, under the disadvantages either of heavier fiscal burthens, less fertile soil, or less favourable climate. Where that premium may be so high as to preclude an abundant supply of food, it is most probable that manufactures will not be established; or if established, that they must decline with reference to the commerce of the world. At least, it must require great superiority of skill, and of mechanical and other advantages to ensure success.

§ 51. It is highly probable that the productions of Canada and the Western States, could even now be landed as cheaply on the eastern coast of New Brunswick as they can be obtained at any port on the Atlantic coast. Even cotton may eventually be included amongst those productions. If an adequate and steady demand should exist, it is most probable that the rate of freight would fall

indefinitely low. The free navigation of the Saint Lawrence, now at hand, will favour this tendency ; but facility of re-shipment at all seasons, will be indispensable. The nearest port adapted to afford this facility in the highest degree, is that of Saint John, and the most favourable communication with this port will be that of the proposed Railway.

§ 52. The severe pressure of competition has rendered a supply of food on the lowest possible terms, an imperative necessity to the British home manufacturer. One region which is a chief source of his dependence for that supply, comprises Canada and the Western Territory of the American Union. A manufacturer resident in New Brunswick, would therefore have, as compared with another resident in England, a premium of three thousand miles of transportation : First, on the produce of his own industry ; and second, on the supply of food which he would receive in exchange. The market upon which the former would rely, would not be the limited one of New Brunswick. He might indeed, as no doubt he eventually would, almost exclusively occupy this market ; but the great market to him, would still be that of the world. He would be, at least geographically, in a more favoured position than if resident in England. The whole of the American Continent north of the equator, would be more promptly accessible ; and his intelligence of the various markets, at least within that limit, will eventually be instantaneous and constant. In seeking a wider field, he would find the Bay of Fundy as favourable a starting point as the English Channel, for the Cape and the Indian Ocean on one hand, and somewhat more favourable with reference to South America and the Pacific on the other.

Any unfavourable difference in the price of labour could hardly long subsist with unrestricted facility of emigration from the overgrown manufacturing districts.

§ 53. The first manufactures of the Colonies will be chiefly of the most useful and necessary descriptions. They will in fact, both create and supply a market which can have no existence without them. Any just ground of jealousy between the Home and Colonial manufacturer can only be remote. It will be contingent upon the successful establishment of the latter as a competitor in the general market, and will then admit of removal by well-disposed minds, representing each division of the national interest, and earnestly bent upon that object. The Colonist would have every motive to bear, not merely a just, but a generous share of the burthen of the common security throughout the world.

§ 54. Lastly, the assurance of adequate revenue is strengthened by the local position of this Line. It must for all time be the chief

arterial Line of inland transit, for about one fifth of the area of New Brunswick. Physical obstacles will prevent the formation of parallel lines through any considerable portion of its extent, either north or south, which will not diverge from some point of this Line, as their natural main stem. It must also be intersected by all other principal Lines eastward of Saint John.

§ 55. Therefore, whether the work be regarded as a principal branch of the projected National Line between Halifax and Quebec, or as a future thread, in the great iron net-work of American coast and inland communication now approaching the frontier, or independently of either, as a work demanded solely by the agricultural, maritime, and social interests of the Province; it is in each case important, but in the last are its claims to consideration the most urgent, and the assurance of immediate benefit and success, the most reasonable and sufficient.

I have the honor to be, Sir,

Your most obedient servant,

J. WILKINSON.

The Hon. J. R. Partelow, Provincial Secretary, &c.

APPENDIX.

No. 1.

TABLE OF GRADIENTS

Commencing at the City of Saint John, touching at the Bend of Petitcodiac, and terminating at Shediac Harbour.

No. of Plane.	Length in Miles.	Total distance from Saint John. Miles.	Height of termination of each plane above Spring Tides at Saint John, in feet.	Rise. Feet.	Fall. Feet.	Rate of inclination	Total Rise Feet.	Total Fall. Feet.
1	2.926	2.926	0	0	0	Level	..	..
2	2.361	5.287	52	52	..	1 in 240	52	..
3	1.950	7.217	13	..	39	1— 262	..	39
4	4.008	11.225	13	..	..	Level	..	..
5	1.755	12.980	5	..	8	1— 1,158	..	47
6	1.713	14.693	13	8	..	1— 1,136	60	..
7	1.394	16.087	5	..	8	1— 914	..	55
8	11.823	27.910	5	..	..	Level	..	..
9	2.003	29.913	11	..	..	1— 1,768	66	..
10	1.949	31.862	20½	9½	..	1— 1,084	75½	..
11	2.792	34.654	20½	..	..	Level	..	..
12	5.038	39.692	37	16½	..	1— 1,619	92	..
13	2.635	42.327	37	..	..	Level	..	..
14	2.368	45.695	61½	24½	..	1— 724½	116½	..
15	1.885	47.580	45	..	16½	1— 603	..	71½
16	4.275	51.855	71	26	..	1— 868	142½	..
17	1.323	53.178	86	15	..	1— 468	157½	..
18	2.910	56.088	150	64	..	1— 240	221½	..
19	1.500	57.588	117	..	33	1— 240	..	104½
20	2.790	60.378	106	..	11	1— 1,330	..	115½
21	3.261	63.639	92	..	14	1— 1,230	..	129½
22	4.370	68.009	64	..	28	1— 824	..	157½
23	3.183	71.192	64	..	..	Level	..	..
24	8.430	79.622	5	..	59	1— 752	..	216½
25	1.386	91.008	5	..	..	Level	..	..
26	5.160	96.168	115	110	..	1— 247	331½	..
27	2.259	98.427	143½	28½	..	1— 441	360	..
28	1.661	100.088	110	..	33½	1— 263	..	250
29	2.897	102.985	103	..	7	1— 2,277	..	257
30	3.977	106.962	— 18	..	121	1— 174	..	378
31	0.627	107.589	— 18	..	..	Level	..	..

No. 2.

TABLE OF GRADIENTS

Petitcodiac,

Commencing at 68 miles from Saint John, and thence by the most direct practicable route to Shediac Harbour.

[illegible]

No. 3.
TABLE OF TANGENTS AND CURVES.

No. of Tangent.	No. of Curve.	Length of Tangent.	Tangents of half adjacent arcs.	Reduced Tangents.	CURVATURE.				Length of Curve.	Distance from St. John.	
		Links.	Links.	Links.	To right.	To left.	Radius.		Links.	Links.	Miles.
1	..	7,850	—	6,850	..	..	..	..	..	6,850	.856
2	1	9,970	—	7,070	..	25 38	4,396	2,901	1,966	8,816	1.102
3	2	..	—	..	..	..	..	..	..	15,886	1.986
4	3	8,151	—	4,551	..	23 39	9,073	5,988	3,745	19,631	2.454
5	4	..	—	..	..	..	..	..	..	24,182	3.023
6	5	7,911	—	4,811	..	..	7,775	5,131	3,347	27,529	3.441
7	6	3,180	—	780	..	12 00	13,320	8,791	2,789	32,340	4.042
8	7	10,550	—	6,830	..	..	5,558	3,668	1,980	35,129	4.391
9	8	5,220	—	0	20 25	..	7,346	4,848	5,209	35,909	4.489
10	9	9,035	—	5,035	..	40 38	..	..	..	37,889	4.736
11	10	4,000	—	331	..	..	..	..	..	44,719	5.590
12	11	3,480	—	482	25 38	..	10,909	7,200	4,980	49,928	6.241
13	12	13,410	—	11,261	43 52	..	3,725	2,458	2,552	54,808	6.851
14	13	5,300	—	0	..	..	..	..	..	59,843	7.480
15	14	9,540	—	3,405	..	69 58	3,100	2,046	3,785	62,695	7.837
16	15	..	—	..	..	..	..	..	..	63,026	7.878
17	16	11,165	—	3,405	..	..	..	..	..	66,811	8.351
18	17	..	—	..	..	..	..	..	..	67,293	8.412
19	18	13,410	—	11,261	7 54	..	12,000	7,920	1,654	68,947	8.618
20	19	5,300	—	0	..	27 31	5,391	3,558	2,589	80,208	10.026
21	20	9,540	—	3,405	..	..	..	..	..	82,797	10.349
22	21	..	—	..	..	..	..	..	..	82,797	10.349
23	22	11,165	—	3,405	43 51	..	9,888	6,526	7,567	90,364	11.295
24	23	..	—	..	..	..	..	..	..	90,364	11.295
25	24	13,410	—	11,261	23 38	..	26,576	17,540	10,961	101,325	12.665
26	25	5,300	—	0	..	..	..	..	..	104,730	13.091
27	26	9,540	—	3,405	..	..	..	..	..	..	..

44	44	17,800	-1,147+1,303	15,410	25 13	947 31	Total Curved Line,	233,768	106.723
45	45	38,625	-1,303+398	36,924	22 40	947 31	" Straight Line,	620,020	106.723
					3 48		" Distance, ..		
46	46	45,510	-398+1,074	44,038	25 13	947 31	Total Curved Line,	233,768	106.723
47	47	25,740	-1,074+2,685	21,971	30 10	947 31	" Straight Line,	620,020	106.723
48	48	10,000	-2,685+1,813	5,492	28 02	947 31	" Distance, ..		
49	49	6,745	-1,813+1,498	3,434	23 38	947 31	Total Curved Line,	233,768	106.723
50	50	7,080	-1,498+4,850	732	23 17	947 31	" Straight Line,	620,020	106.723
51	51	15,880	-4,850+1,648	9,382	23 17	947 31	" Distance, ..		
52	52	110,000	-1,648+2,083	7,269	23 32	947 31	Total Curved Line,	233,768	106.723
53	53	100,000	-2,083+621	7,296	11 49	947 31	" Straight Line,	620,020	106.723
54	54	3,835	-621+728	2,486	51 45	947 31	" Distance, ..		
55	55	8,645	-728+1,977	5,940	51 45	947 31	Total Curved Line,	233,768	106.723
56	56	9,540	-1,977+2,746	4,807	43 09	947 31	" Straight Line,	620,020	106.723
57	57	28,790	-2,746+609	25,425	45 57	947 31	" Distance, ..		
58	58	49,135	-609+6,267	42,269	5 49	947 31	Total Curved Line,	233,768	106.723
59	59	30,400	-6,267+2,384	21,749	64 09	947 31	" Straight Line,	620,020	106.723
60	60	7,450	-2,384	5,066	26 49	947 31	" Distance, ..		
							Total Curved Line,	233,768	106.723
							" Straight Line,	620,020	106.723
							" Distance, ..		

No. 4.

Summary of the lineal extent in miles of each description of road formation:—

Sections.	Excavation.	Embankment & surface line.	Piled foundation.	Bridging.	Total.
1	2.800	2.544	3.515	0.141	9.000
2	4.250	3.675	.769	.306	9.000
3	1.962	1.113	5.485	.440	9.000
4	4.513	4.771	4.579	.137	14.000
5	3.037	2.025	6.853	.085	12.000
6	4.975	3.388	1.625	.012	10.000
7	1.650	1.902	4.322	.126	8.000
8	9.556	6.582	2.571	.291	19.000
9	5.333	11.257	...	.133	16.723
	38.076	37.257	29,719	1.671	106.723

No. 5.

ESTIMATE.

SECTION 1.—From Saint John to 9th mile.

Earthwork, ...	153,310 yards @ 9d.,	£5,749	2	6
Rock excavation, ...	72,496 yards @ 5s.,	18,124	0	0
Masonry, ...	920 yards @ 20s.,	920	0	0
	780 yards @ 10s.,	390	0	0
3 Truss Bridges for Streets, 24 feet span, ...		180	0	0
4 Bridges across Marsh Creek, ...		1,500	0	0
1 Bridge at Davidson's Cove, ...		100	0	0
3 Road crossings, ...		37	10	0
2 Bridges over Post Road, ...		240	0	0
Wharf, Warehouse, Passenger Station, Engine House, Machine Shop, Turn Tables, &c., at Saint John terminus, ...		5,000	0	0
Passenger and Freight Station near 9th mile, ...		250	0	0
Fencing, ...		1,000	0	0
Superstructure for 10 miles, inclusive of 1 mile of siding, and allowance for Timber frame and Pile formation, at £1,500 per mile, ...		15,000	0	0
Add 10 per cent. for superintendence and contingencies, ...		£48,490	12	6
		4,849	1	3
		£53,339	13	9

Equal to £5,926 10 5 per mile.

SECTION 2.—From 10th to 18th mile inclusive.

road	Earthwork,	194,639 yards @ 9d.,	£7,298 19 3
	Rock excavation,	10,294 yards @ 5s.,	2,573 10 0
	Clearing and grubbing,	...	200 0 0
fal.	Masonry,	400 yards @ 20s.,	400 0 0
		60 yards @ 15s.,	45 0 0
0.000		1,260 yards @ 10s.,	630 0 0
0.000	Bridge at Henderson's Cove,	...	5,000 0 0
0.000	Bridge at Harris's Cove,	...	3,300 0 0
1.000	3 Bridges at Hammond River,	...	3,000 0 0
0.000	2 Road Bridges,	...	180 0 0
0.000	2 Road crossings,	...	27 10 0
0.000	Fencing,	...	900 0 0
0.000	Passenger and Freight Station at Gondola Point,		
0.723	£500; at Hammond River, £100, ...		600 0 0
0.723	Superstructure 10 miles, including 1 mile siding,		
	at £1,500,	...	15,000 0 0
			£39,154 19 3
	Add 10 per cent.,	...	3,915 9 11
			£43,070 9 2

Equal to £4,785 12 1 per mile.

SECTION 3.—From 19th to 28th mile inclusive.

2 6	Earthwork,	70,479 yards @ 9d.,	£2,642 19 3
0 0	Masonry,	100 yards @ 15s.,	75 0 0
0 0		480 yards @ 10s.,	240 0 0
0 0	Station at Hampton,	...	750 0 0
0 0	Station at 26th mile,	...	150 0 0
0 0	1 Road Bridge,	...	60 0 0
0 0	4 Road crossings,	...	52 10 0
0 0	Bridge at Groom's Cove,	...	3,000 0 0
0 0	Bridge across Kennebecasis,	...	1,500 0 0
0 0	Fencing,	...	900 0 0
0 0	Superstructure 9½ miles, inclusive of ½ mile siding		
	at £1,500,	...	14,250 0 0
			£23,620 9 3
	Add 10 per cent.,	...	2,362 0 11
			£25,982 10 2

Equal to £2,886 18 11 per mile.

SECTION 4.—From 29th to 41st mile inclusive.

Earthwork,	482,777 yards @ 9d.,	£18,104	2	9
Masonry,	200 yards @ 20s.,	200	0	0
	344 yards @ 15s.,	258	0	0
	1080 yards @ 10s.,	540	0	0
3 Bridges across Kennebecoasis River,		2,840	0	0
3 Bridges,		510	0	0
6 Road crossings,		80	0	0
3 Road Bridges,		294	0	0
Station at 29th mile,	£150	0	0	
Station at 34th mile,	250	0	0	
Station at Mill Stream,	350	0	0	750
Fencing,		1,300	0	0
Superstructure, 14½ miles, inclusive of ½ mile siding, at £1,500,		21,750	0	0
		£46,626	2	9
Add 10 per cent.,		4,662	12	3
		£51,288	15	0

Equal to £3,945 5 9 per mile.

SECTION 5.—From 42d to 53d mile inclusive.

Earthwork,	103,628 yards @ 9d.,	£3,886	1	0
Clearing and grubbing,		150	0	0
Masonry,	56 yards @ 20s.,	56	0	0
	379 yards @ 15s.,	284	5	0
	700 yards @ 10s.,	350	0	0
6 Bridges,		1,838	0	0
1 Road Bridge,		72	0	0
8 Road crossings,		97	10	0
Station at Sussex Vale, including Engine House, and Turn Table, £1,200 ; at 52d mile £250,		1,450	0	0
Fencing,		1,200	0	0
Superstructure, 13 miles, inclusive of 1 mile siding, at £1,500,		19,500	0	0
		£28,883	16	0
Add 10 per cent.,		2,888	7	7
		£31,772	3	7

Equal to £2,647 13 7 per mile.

SECTION 6.—From 54th to 63d mile inclusive.

Earthwork,	276,802 yards @ 9d.,	£10,380	1	6
Grubbing and clearing,	...	250	0	0
Masonry,	900 yards @ 10s.,	450	0	0
5 Bridges,	...	290	0	0
4 Road crossings,	...	50	0	0
1 Station,	...	200	0	0
Fencing,	...	1,000	0	0
Superstructure, 10½ miles, inclusive of ½ mile siding, at £1,500,	...	15,750	0	0
		<u>£28,370</u>	<u>1</u>	<u>6</u>
Add 10 per cent.,	...	2,837	0	2
		<u>£31,207</u>	<u>1</u>	<u>8</u>

Equal to £3,120 14 2 per mile.

SECTION 7.—From 64th to 71st mile inclusive.

Earthwork,	191,318 yards @ 9d.,	£7,174	8	6
Grubbing and clearing,	...	50	0	0
Masonry,	480 yards @ 10s.,	240	0	0
8 Bridges,	...	2,060	0	0
7 Road crossings,	...	87	10	0
1 Station,	...	500	0	0
Fencing,	...	800	0	0
Superstructure, 8½ miles, inclusive of ½ mile siding, @ £1,500	...	12,750	0	0
		<u>£23,661</u>	<u>18</u>	<u>6</u>
Add 10 per cent.,	...	2,366	3	10
		<u>£26,028</u>	<u>2</u>	<u>4</u>

Equal to £3,253 10 3 per mile.

SECTION 8.—From 72nd mile to Bend, inclusive.

Earthwork, 568,832 yards @ 9d.,	£21,331	4	0
Grubbing and clearing,	250	0	0
Masonry, 2,750 yards @ 20s.,	2,750	0	0
4,560 yards @ 10s.,	2,280	0	0
7 Bridges across Main Petitcodiac River, ...	8,881	0	0
24 Road crossings,	300	0	0
Additional material and labour for 1½ miles pile foundation and facing on bank of Petitcodiac River,			
650	0	0	
Fencing,	1,900	0	0
Station near Fredericton and Shepody Roads,	1,000	0	0
Station, including Wharf, Engine House, and Turn Table, at Bend of Petitcodiac, ...	1,500	0	0
Superstructure, 20 miles, including 1 mile siding, £1,500,	30,000	0	0
	£70,842	4	0
Add 10 per cent.,	7,084	4	5
	£77,926	8	5

Equal to £4,101 7 10 per mile.

SECTION 9.—From Bend to Shediac.

Earthwork, 515,268 yards @ 10d.,	£21,469	10	0
Grubbing and clearing,	450	0	0
Masonry, 1,310 yards @ 20s.,	1,310	0	0
104 yards @ 15s.,	78	0	0
3,924 yards @ 10s.,	1,962	0	0
4 Bridges,	2,022	0	0
2 Road Bridges,	280	0	0
5 Road crossings,	70	0	0
Fencing,	1,700	0	0
2 Stations, £100, £300,	400	0	0
Station, including Wharf, Engine House, Turn Table, &c., at Shediac,	3,000	0	0
Superstructure, 17½ miles, inclusive of 1 mile siding, £1,500,	26,625	0	0
	£59,366	10	0
Add 10 per cent.,	5,936	13	0
	£65,303	3	0

Equal to £3,898 13 11 per mile,

[illegible]

RECAPITULATION.

Section.	Length.	Length of Siding.	Earthwork.		Rock cutting.	Clearing and grubbing.		Excavation and embankment.		Masonry.		Bridging and road crossings.		Stations.		Fencing.		Super-structure.		10 per cent. for superintendence and contingencies.		Total.	Cost per mile.							
			cu. yds.	sq. yds.		£	s	d	£	s	d	£	s	d	£	s	d	£	s	d	£		s	d	£	s	d			
1	9	1	183,310	72,496	0	0	0	23,873	2	6	1,310	0	2,067	10	0	5,250	0	1,000	0	15,000	0	4,849	1	53,339	13	9	56,962	10	5	
2	3	1	134,638	10,294	0	0	0	9,873	2	6	1,075	0	1,507	10	0	600	0	900	0	15,000	0	3,915	1	43,070	9	2	4,786	12	5	
3	3	1	70,479	...	0	0	0	9,643	19	3	315	0	4,619	10	0	900	0	900	0	14,250	0	2,362	0	25,982	10	2	3,846	18	11	
4	12	1	482,777	...	0	0	0	18,104	9	3	998	0	3,794	0	0	750	0	1,300	0	21,750	0	4,663	12	51,988	15	0	3,945	5	9	
5	12	1	163,638	...	0	0	0	3,886	1	0	630	5	0	2,007	10	0	1,450	0	1,200	0	19,500	0	2,898	7	31,772	7	12,647	13	7	
6	10	1	276,804	...	0	0	0	10,580	1	6	450	0	340	0	0	900	0	1,000	0	15,750	0	2,837	0	31,907	1	83,130	14	2	3	
7	8	1	191,318	...	0	0	0	7,174	8	6	240	0	2,137	10	0	900	0	800	0	19,750	0	2,366	3	96,628	3	4	2,363	10	2	
8	9	1	583,832	...	0	0	0	21,469	10	0	5,030	0	9,831	0	0	2,500	0	1,500	0	30,000	0	7,084	4	77,996	3	54,101	7	10		
9	16½	1	515,268	...	0	0	0	21,469	10	0	3,350	0	2,572	0	0	3,400	0	1,700	0	26,625	0	5,136	13	65,363	3	63,898	13	11		
106½	7	2,557,053	82,790	1350	0	0	118,733	18	913,458	5	0	98,599	10	0	0	0	10,700	0	0	170,625	0	0	0	405,918	7	1				

Add for running stock,—12 Locomotive Engines, ..

Add for running stock,—12 Locomotive Engines, . . .

10 Passenger Cars, £4,500,

4	do.	do.	2,000,
4	do.	do.	550
4	do.	do.	550

4 Snow Ploughs, 560,

Total estimated cost,

£18,000

£750, 2 11,000

3,750,544 1,000

440, 1,000

£435,918 7 1

No. 6.

(Extracted from 13th Annual Report of the Directors of the Western Rail Road, Massachusetts.)

A.—Amount received from all sources, for the years 1842 to 1846 inclusive.

Y ^{rs} .	Passengers.	Merchandise.	Mails, &c.	Total.	Expenses.	Balance of Receipts.	Miles run.
1842	\$266,446.83	\$226,674.61	\$19,566.84	\$512,688.28	\$266,619.30	\$246,068.98	397,295
1843	275,139.64	275,696.19	23,046.68	573,882.51	302,973.66	269,909.45	441,608½
1844	358,694.00	371,131.84	23,926.88	753,752.72	314,074.20	439,678.52	499,968
1845	366,753.62	420,717.30	26,009.83	813,480.15	370,621.25	442,858.90	530,201
11 months of 1846	389,861.42	459,365.18	29,191.29	878,417.89	412,679.80	465,738.09	573,956
Mean, ...	\$331,379.10						

B.—Number of Through and Way Passengers.

YEARS.	Th'ro' Passengers.		Way Passengers.		Total Through Passengers.	Total Way Passengers.	Total 1st Class.	Total Second.	Grand Total.
	1st Class.	Second.	1st Class.	Second.					
1842	15,520	2,680½	148,500	23,366	18,570½	171,866	16,390	26,046½	190,436½
1843	19,987	6,608	140,425	33,945½	26,595	174,370½	160,412	40,553½	200,965½
1844	17,016½	7,314	140,868½	55,058½	24,330½	195,927	157,885	62,372½	220,257½
1845	13,401½	5,791	144,723	59,717½	19,192½	204,440½	158,124½	65,508½	223,633
11 months of 1846	21,033	8,799½	165,196	70,635½	29,832½	235,831½	186,229	79,435	265,664
Mean, ...					23,704	196,487			

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11 months of 1845 | 21,033 | 8,799 | 165,196 | 70,635 | 29,832 | 23,704 | 196,487 | 235,331 | 186,229 | 79,435 | 265,664

Mean, ...

PRELIMINARY REPORT

ON

THE PROPOSED LINE OF RAILWAY

BETWEEN THE
CITY OF SAINT JOHN AND THE HARBOUR OF SHEDIAC.

Fredericton, 3d March, 1849.

SIR,—Since the close of the Exploration and Survey of the proposed Line of Railway between Saint John and Shediac, the construction of the plans and sections in a manner to be practically available for definitely laying out the work, has been proceeding with all diligence, with a view to complete the same during the present Session of the Legislature. But the extent of labour involved renders doubtful the possibility of accomplishing this object.

In the meantime it is less difficult to supply for the information of His Excellency the Lieutenant Governor, such general description of the character and merits of the Line as may be necessary to satisfy the immediate interest of the Legislature and the Public.

Section 1. Commencing at the head of the Mill Pond in the City of Saint John, the first portion of the Line, for a distance of upwards of 4 miles, presents no material obstacle. At Lawler's Lake, near the fifth mile, the route is crossed by a barrier of solid limestone of upwards of a mile in width. This may be surmounted by a rise eastward of 22 feet per mile for about 1½ miles, and a fall of 20 feet per mile for about 2 miles. To attain these gradients a mean depth of 12 to 15 feet of rock cutting for a mile in extent will be necessary. The maximum depth will be about 35 feet for 7 or 8 chains only.

§ 2. From hence following the Shore of Kennebecasis Bay, the chief obstacles are Davidson's, Henderson's, Harris', and Forrester's Coves, until we reach the head of the last, at a distance of 15½ miles from Saint John. The intersection of these in a favourable manner will require due consideration. The cost of this portion of the Line must necessarily exceed the average expense of the remainder; but the result will be the attainment of gradients varying very

slightly from a level. It was supposed that a shorter, less expensive, and sufficiently favourable route might be found through Lakefield, by the Valley of Salmon Creek. But the result of a careful exploration and section proved that the summit could not be overcome by a less favourable maximum gradient than 136 feet per mile, descending into the Valley of Hammond River. It is exceedingly doubtful that any other descent into the Valley of this River would prove more favourable.

§ 3. From the head of Forrester's Cove the Line will intersect Hammond River nearly a mile below the present Bridge, and continue by a straight line through the Marsh until it touches the south shore of Darling's Lake. Following the latter by easy curves, and nearly on a level, until it intersects Groom's Cove; it proceeds thence with slight deviation from a direct course, to the head of Acicack Marsh, near Hampton Ferry, and at 23 miles 24 chains from Saint John. From thence it continues by a direct and level line along the Marsh, intersecting the Kennebecasis at a favourable point a little below Mr. Wright's Farm; and thence with a slight change of direction, to the northern end of the old Toll Bridge, at 28 miles from Saint John.

§ 4. From hence it was supposed that the Line might avoid the immediate bed of the Valley, by following a lateral valley running nearly parallel, and to the north westward of the Post Road. A comparative survey and section proved that there would be no saving in distance and most probably a heavier expense of construction, whilst the gradients, though very favourable, would be greatly inferior, involving for a mile and a half in distance a maximum of 25 feet per mile, against a nearly uniform level by the River route.

§ 5. Following the latter from the Toll Bridge, to the left of Norton Upper Church, by a direct Line crossing Hay's and Barbarie's Meadows, and the River to the foot of the high ground on the left or southern bank, nearly opposite to the Roman Catholic Chapel, and thence following this bank by a course nearly straight, the line recrosses the River near the Finger Board, at a distance of 34 miles from Saint John.

§ 6. From hence the Line will most favourably follow through the right or northerly bank of the River, varying from level to the maximum rise of seven feet per mile, until it approaches Studholm's Mill Stream, at 42 miles 32 chains from Saint John. A little below this Stream it will again cross the main River, and thence keeping as close as practicable to the left or southerly shore, it will recross the River twice within the distance of half a mile, a little below the situation of Fox Hill, and will continue thence nearly

straight, gradually leaving the River widely to the left and rising at nearly the uniform rate of seven feet per mile, to the Race Course, on the property of A. C. Evanson, Esquire, Sussex Vale, at the distance of 45 miles 61 chains from Saint John.

On reaching this situation, the traveller is scarcely conscious that he has yet not attained so high an elevation above the level of the Sea as the greater part of the City of Saint John.

The following is the relative height of this point in Sussex Vale :

Above the highest Freshet level of Kennebecasis Bay, 51 feet.

"	High water, Spring Tides, at Saint John,	56
"	" " " at Bend of Petitcodiac, 53	
"	" " " at Shediac,	76

§ 7. From hence, passing a slight rise, and again descending by a fall of 12 feet per mile into the Valley of Salmon River, (the principal branch of the Kennebecasis,) the course of the Line will be nearly direct, with an uniform rise of seven feet per mile, to the mouth of Stone's Brook, distant 52 miles 28 chains from Saint John.

§ 8. From hence the choice of two routes is offered, of each of which a careful survey and section has been made. The first is by the Valley of Stone's Brook to the immediate source of the Annagance. The second continues by the Valley of the Salmon River to the "Portage," and thence, after twice intersecting the Post Road, descends and meets the former route at a lower point in the Valley of the Annagance.

The distance by each route will be nearly the same ; but by the first the summit is crossed by a maximum rise of 22 feet per mile, and the same rate of fall for a short distance into the Valley of the Annagance.

By the second an equally favourable rise can be obtained only by a heavier proportion of cutting and embankment, and it will not be easy to obtain a more favourable descent into the Valley of the Annagance than at the rate of 40 feet per mile.

As the intersection of this summit will determine the maximum gradient eastward, between the Bend of Petitcodiac and Saint John, the route by Stone's Brook is therefore obviously to be preferred.

By this route the summit is passed at a distance of 56 miles 13 chains from Saint John, and at an elevation of 150 feet above high water.

§ 9. For a short distance, as already observed, the descent is thence at the rate of 22 feet per mile, and afterwards at the uniform rate of 5 feet per mile, to opposite Hayward's Mills, distant 63 miles 56 chains from Saint John. From thence by a nearly uniform descent of 6 feet per mile, the Line passes Steves' Mill at 66 miles 62 chains, and Steves' Tavern at 69 miles from Saint John.

§ 10. After first touching the Petitcodiac River, the course of the Line will require mature consideration, and will be governed by the result of the Survey of the River. It was a prevailing opinion amongst the more intelligent inhabitants, that the Table Land on the north side of the Petitcodiac would prove to be favourable. Its general appearance so far sustained this opinion that the fact could be determined only by actual examination.

The chief advantage of this route would be to avoid contact with the Petitcodiac River. A thorough exploration and section were therefore made, the general results of which are as follow :—

From Steves', the section presents a series of ascending and descending inclinations, varying from 5 to 25 feet per mile, to the Fredericton Road, near Pitfield's, at the distance of 77 miles 21 chains from Saint John.

From thence the inclinations vary from 12 to 78 feet per mile, to Hall's Stream, at the distance of 90 miles 22 chains from Saint John; and from thence, by inclinations varying from 4 feet to 53 feet per mile, to Milne's Point, Shediac Harbour, distant 105 miles 20 chains from Saint John.

These unfavourable gradients proved not only the necessity of a survey of the immediate Valley of the Petitcodiac River, but also of a thorough re-exploration of the ground between the Bend and Shediac.

§ 11. Two other variations of route between the latter were therefore surveyed and levelled; and thus a comparison of three routes was obtained, each terminating near the mouth of Hall's Stream, at the Bend, and at Milne's Point, at Shediac. The courses of these routes will be more easily understood by a glance at the Map than by much description.

The following is a brief summary of their respective merits :—

	Distance from Bend to Shediac.	Maximum Gradient.	
		Eastward.	Westward.
1. Mill Stream and direct Route,	15 m. 30 c.	38 ft. per m.	53 ft. per m.
2. Babineau Marsh and Scadovck Route,	16 miles.	86 "	30 "
3. Mill Stream and Scadovck Route,	16 m. 54 c.	23 "	30 "

It is probable that a fourth route by way of the Valley of the Shediak River, with a still more favourable maximum gradient than the last, might be found, but only by materially increasing the distance, and with an unfavourable approach to the Harbour.

§ 12. It remains only to compare the merits of the immediate Valley of the Petitcodiac, and of the Table Land northward, for the object of the Railway.

The latter route would present alternate rises and falls which at some points could be reduced to bare practicability only by heavy cuttings and embankments; whilst the only advantage proposed would be to avoid contact with the tortuous channel, tides, floating ice, and soft banks of the Petitcodiac.

It does not appear however that it is really necessary to come in contact with these in any manner involving material difficulty; whilst the working character of the Line, when constructed, would be of unsurpassed excellency.

From Steves' to Pitfield's, the mean inclination would scarcely be 7 feet per mile, and from thence nearly all the remaining distance to the Bend, about 14 miles, would be level.

The increase in the whole distance from Saint John to Shediak by this route, will be about three miles, but with the advantage of touching the Harbour at the Bend, which is not approached within two miles by the direct route.

By adopting the immediate Valley of the Petitcodiac, we have therefore a Line of Railway less than 108 miles in extent; connecting three of the most important Harbours in the Province by a ruling gradient between level and 7 feet per mile, and one maximum gradient of only 30 feet per mile.

§ 13. It is scarcely doubtful that by a slight variation of the Line and some increase of expense, the rise of 30 feet per mile from Shediak, might be reduced to the same limit as that at Stone's Brook, say 22 feet per mile, which would then become the heaviest gradient of the Line.

This rise is very little greater than what is termed the angle of repose; or that inclination upon which the friction of a Train of Carriages at rest is just sufficient to prevent their being set in motion by the force of gravity.

§ 14. A system of gradients so favourable, will place this Road in the first class of working Lines.

It is true that advanced knowledge and experience have proved the practicability of ascending steeper inclinations than at an earlier period of Railway construction were deemed to be within the capacity of unassisted Locomotive Engines on smooth Rails, and that therefore, in a difficult country, the necessity of heavy cuttings and embankments is much diminished.

But the economical value of easy gradients is not consequently reduced, where natural facilities admit, as in this instance, of their being obtained at a moderate first cost; for, however adequate may be the mechanical skill necessary to meet the difficulty, the working expenses must be proportionally increased by the steepness of the inclinations to be overcome.

A few words in explanation of this fact may not be misapplied.

A difference of experimental results exists as to the force of traction necessary to set in motion a given load upon a level rail. They vary from seven to nine pounds per ton, giving a mean of about 8lbs or 1-208th part of the load. It is known, therefore, that 1 in 280, or 19 feet nearly per mile, is that degree of inclination which has just been explained as the angle of repose, and is the datum from which to compute the increase of force necessary to overcome any given increase of inclination.

Hence the power which would be sufficient to draw					
upon a level,	...	...	...	...	100 Tons
Would ascend an inclination of 19 feet with only					50
"	"	38	"	"	33
"	"	57	"	"	25
"	"	76	"	"	20

It is yet doubtful whether the effects of this law can be conveniently mitigated by mechanical skill in the adaptation of Locomotive Engines.

It is therefore of importance to devote due pains to the discovery of that line of ground between the extreme points to be connected, which will afford the most favourable maximum gradient at the least warrantable expense.

This object will be more readily appreciated by a view of the working capacities of a few existing or projected Lines in America, the maximum gradients of which are known, as compared with the same capacity of a Line perfectly level.

	Max Gradient in ft. $\frac{1}{2}$ mile.	Load equal to the tractive force of 800 pounds.
Western Rail Road, Massachusetts,	23	18 6-10ths Tons.
New York and Erie Rail Road,	68	21 8-10ths
Montreal and Portland,	50	27 5-10ths
Saint Andrews and Woodstock,	35	35 2-10ths
Saint John and Shediac,	22	46 3-10ths
A level Line,	0	100

To the above may be added that portion of the projected Trunk Line of Railway between Quebec and Halifax, which would intervene between Shediac and the latter Port. The most favourable maximum gradient by which the Cobequid Hills can be crossed, according to the Report of Major Robinson, is 1 in 79, or 66 feet per mile. The same tractive force, therefore, which would transport 46 tons to Saint John, would convey only 22½ tons to Halifax.

If to this important advantage be added that of a saving of at least 42 miles in distance to the Port of Saint John, which is as open and accessible at all seasons of the year as Halifax, it may safely be inferred that the diversion of any portion of the trade which may fairly belong to this Province by the proposed route of the Trunk Line, is exceedingly improbable. It may rather be anticipated with confidence that, in cases of emergency excepted, nearly the whole of the import and export business that may be created by any such connection with the Saint Lawrence, will incline to the open Harbours of the Bay of Fundy.

For these, besides the recommendation of much greater proximity to the Saint Lawrence, have the natural advantage of a high flow of tide, favourable to the prompt examination, repair and equipment of the larger class of vessels, and which is not possessed by Halifax.

§ 15. The curvature of the Saint John and Shediac Railway will on the whole be very favourable. In one or two instances only is it probable that curves of so limited a radius as 2,000 feet will be necessary.

§ 16. With the exception of that at Lawler's Lake, the rock cutting will be insignificant. The earth-work generally will be light, of a quality suitable for a firm road-bed, and easy of execution at common slopes. That between the Bend and Shediac will probably be the heaviest in amount. The largest amount of bridging will fall between Saint John and Hampton Ferry, but with many facilities for its effective and economical construction. There will be no other expensive bridges on the line. The number or extent of these structures cannot at present be stated.

§ 17. The foundation of probably one half of the line may be constructed by piling, a method which has been proved in the United States to be thoroughly effective in securing the all-important quality of a Railway, stability of foundation, especially where the ground is liable to be periodically overflowed, and where the transportation of any other material proper for the road-bed would be too expensive as well as more liable to disturbance and injury. This method is not more remarkable for its efficiency than for the lightness of the cost as compared with other methods, and has

many advantages. The chief objection to its employment is the perishable quality of the material. But if any effective and sufficiently economical preservative process could be applied, that objection would vanish.

§ 18. There is however an important difference between the durability of the wood available in this Province, and of that which has chiefly been employed in the United States. In the latter country a period of ten or twelve years is counted upon as the utmost limit, during which to rely upon the soundness of White Oak Piles; and in the Southern States, Pine is found to decay in half that time. The durability of the Larch of this Province appears to be much greater. Fence-posts of this material have been credibly pointed out as having fulfilled their office for upwards of forty years, and which yet remain to all appearance, sound and efficient. Assuming however, that the ordinary duration of this wood, under the same circumstances, were only half that period, it is to be regretted that it should be destroyed or comparatively sacrificed as an article of export, whilst it is of so much importance to the internal economy of the Province.

§ 19. The present occasion does not permit of reference to the details of construction. It will be sufficient to say that local circumstances and facilities hold out the assurance that the road may be completed within the limit of the average cost of similar works in the State of New York; to some of which it will have more resemblance than to those of New England.

From authentic Tabular Statements which have been published, the average cost of some of the principal Lines of Railway in the States of New York and Massachusetts respectively, appears to be £5,649 currency per mile in the former, and £9,788 currency per mile in the latter, in each case for a single track.—(App. A and B.)

The method of construction, and the conveniences to be provided, would require mature consideration. They ought to be as perfect as the circumstances and reasonable prospects of the line will warrant.

The daily accumulating knowledge and experience on the subject elsewhere, should be amply consulted, and above all, it is desirable that no expenditure should be commenced until the necessary means are secure for completing such divisions of the line as may be profitably opened with the least possible delay; nor until a system for the controul and management of such expenditure shall be so devised and arranged as may best ensure efficiency and a true economy.

§ 20. The division of this line most obviously indicated as the portion which may first be constructed and opened with the surest prospect of an immediate return, is that connecting the Harbour of the Bend with the terminus at Shediac. By means of this work alone, the summer trade of the Gulf and River Saint Lawrence would be accessible from the Bay of Fundy, and the shipping of the Province would be relieved from much of its dependence on Foreign Ports, into which it must necessarily be admitted only on disadvantageous terms.

All that is required through the Atlantic Ports of the United States, must reach the lower Provinces encumbered with the tolls and charges of Canals and Railways of great length, whilst an uninterrupted navigation between the same sources of production and our own Ports, offers a much cheaper means of transit, which only awaits a moderate degree of enterprise to become fully available.

§ 21. The convenience and sufficiency of Shediac as an entrepot for the object in view, is not questioned. It is within sixty hours communication by steam from Quebec. It nearly equally divides the great arch of coast which forms the western boundary of the Gulf of Saint Lawrence, extending from Cape North to Cape Gaspe, a distance of about 450 miles, embracing in that extent a soil of acknowledged excellence; and fisheries, the ultimate commercial value of which, to these Provinces, would perhaps be dearly exchanged for the more dazzling treasures of other coasts. The fertile Island of Prince Edward, lies almost in view of the Harbour, and the coal mines in Pictou within a few hours sail. Indications of coal also every where surround this important locality; and from Saint John to Shediac—in addition to lumber and most descriptions of farm produce—limestone, freestone, gypsum, salt, and iron, in abundance, will eventually become tributary to the traffic of the line.

Independently of these considerations, the intrinsic importance of the Harbour of Shediac to Shipping frequenting the Gulf, is thus stated by Captain Bayfield:—

“Shediac Harbour is the easiest of access and egress on this part of the Coast, being the only one which a vessel in distress can safely run for as a Harbour of Refuge. The space in which shipping may be moored, in from 12 to 17 feet at low water, is three quarters of a mile long and from 170 to 300 fathoms wide. The depth that can be carried in by a good Pilot is 14 feet at low water, and 18 feet at high water in ordinary Spring Tides; and the bottom of the channel is of mud, as is also the Harbour within. Although a slight swell may be felt in this Harbour at high water,

in a north east gale, yet it is never sufficient to endanger in the slightest degree a vessel with good anchors and cables; even in the Bay outside the Bar, a vessel would ride safely in any gale not unusually strong for the summer months."

§ 22. The extent of navigation which would be saved by this communication between the Ports of Saint John and Quebec, would generally be from 500 to 600 nautical miles.

§ 23. It has been a cherished scheme almost coeval with the first settlement of the Province, to intersect the Isthmus separating the Bay of Fundy and the Gulf of Saint Lawrence, by a Canal. The absence of such an advantage has doubtless been very unfavourable to Inter-Colonial intercourse. But now that this enterprise remains in abeyance, it may be no cause of regret that the desired communication is not dependent upon a work of questionable expediency, as well as very doubtful practicability. Besides being more costly and liable to damage, a Canal sealed up for several months in the year, could not be equal in commercial value to a Railway.

§ 24. In touching upon the question of the probable cost of this Railway, it seems proper to remark, that in the cost of those to which reference has been made, an expenditure equal to about £2,000 currency per mile is included for the heavy iron rail, and its necessary appurtenances and fastenings.* The plate rail now generally abandoned as insufficient, might probably cost half that sum. It is true that iron rails could be procured by this Province from England at a lower rate than they can be obtained in the United States; but it is doubtful that the difference would exceed about £500 per mile in our favour, even at the present low rate of the material. By the adoption of an efficient iron rail, a charge of about £1,500 currency per mile would therefore be necessary, amounting upon the whole Line, for a single track only, to the large sum of £162,000, of which £24,000 would fall upon the Bend and Shediac Division.

* Since the period to which this estimate would apply, the price of iron, delivered in the United States, has fallen probably one half. Yet the great fluctuations to which it is liable renders it not less important to the interests of new Railways, that their plan of construction should involve as small a proportion of iron as may be compatible with efficiency. The great advantage to Railway construction in these Provinces is the unlimited command of timber, at comparatively a nominal price, for continuous bearings. A continuous bearing of timber is properly the effective rail, and may be of any required strength. Combined with such a rail, the only useful office which the iron can perform is that of guarding the timber from abrasion. For this purpose cast iron, laid continuously upon wood, in a judicious manner, may prove to be equally effective with wrought. If so, beside the great advantage in cost, the adoption of the former would place nearly the whole means of construction within the limit of Provincial resources.

Now if by any method of construction all the essential qualities of a good Railway can be obtained, without at least the *immediate* necessity of this heavy charge, it will be agreed that in the present circumstances of the Province, it is desirable that such method should be fairly tried.

The saving in the item of iron alone would go a great way towards constructing a branch extension of this Railway through the most populous and fertile part of the Province to Fredericton, within a distance of 55 miles.

If on the assumed postponement of the iron rail, we therefore deduct the sum of £1,000 from the average cost of Railways in the State of New York, (the light plate rail only until recently having been used on these Roads,) we have the probable sum of £4,650, as the extreme cost per mile. This, taking into consideration the difference in value of timber in favour of this Province, may be regarded as a safe limit for present guidance. It is in fact, exclusive of the iron, equal to the cost of some of the best Lines of Railway in Massachusetts, not perhaps more easy of construction than the greater part of that between Saint John and Shediac.

§ 25. Upon this basis the cost of the division between the Bend and Shediac, for the distance of 16½ miles nearly, would be £74,400.

The successful opening of this portion of the Line would be a sure augury of the rapid construction of the remainder to Saint John. It is perhaps the shortest and most desirable experimental Line that could be constructed in the Province, and holds out the best assurance of success.

§ 26. Upon this point we are not left altogether to conjecture. By direction of the Government, during the past autumn, the travelling at six different stations in the Province, was registered during three months, by persons appointed for that purpose. An abstract of the result in a tabular form is annexed, (App. C.) with a computation of the number of travellers at the same rate for a whole year.

The autumn, however, is considered the least favourable season during which to form an estimate of the aggregate of the year, as the rural population are then more restricted to the business of their farms. At other periods the highways frequently exhibit long unbroken lines of vehicles, demonstrating by the numbers, circumstances, and travelling disposition of the people, that the period has arrived for the introduction of the rail.

Even under the unfavourable circumstances adverted to, the lowest number of passengers at any station exceeds the number conveyed over some of the existing Railways in the United States,

according to late official Reports. A statement of a few of these is annexed, (App. D.); but the number at the principal station, the Bend, exceeds the estimated number of at least one English Railway prior to its construction—the Great North of England. The estimated number for this line was 75,158. The number at the Bend, as derived from the registration, is 87,700.

Referring to other statistical statements (Notes a and b, App. F.) we find the last number exceeds even the realised traffic on at least two English Railways, and that the traffic of one of these falls short of the common Road traffic at three of the registered stations in New Brunswick.

§ 27. But in almost every instance the immediate consequence of the opening of a Railway is a vast increase of the number of travellers, varying from 100 to even 1,400 per cent. The annexed tabular statements will illustrate this fact. (App. E. and F.)

Assuming, therefore, on the evidence of experience wherever Railways have been established, that the increase of the ordinary travelling on the Saint John and Shediac Line will not fall short of at least 100 per cent. over that already in existence, and omitting that portion of the travelling at the Bend which inclines towards Dorchester, as not forming a part of that which would belong to the division between the Bend and Shediac, we have $(21,925 - 5,946 \times 8) = 127,832$, as the lowest number of passengers which may be counted upon during the first year's operation of the Railway.

Estimating the gross Revenue to be derived from these at a 1½d. each per mile, or 2s. for the fare through, the amount would be	£12,783	0	0
Add for freight of merchandize and goods of all kinds at the assumed equivalent of 200,000 barrels, at 6d.,	5,000	0	0
Total gross revenue,	£17,783	0	0

If we take the working expenses of the Line at the average of 38 per cent. of the gross receipts, according to experience in the State of New York, then—

From the gross revenue of	£17,783	0	0
Deducting 38 per cent.,	6,758	0	0

The net revenue will be £11,025 0 0

Or 14 8-10ths per cent. net return upon the whole cost of £74,400 for the first year, and which, as in other instances, may be expected steadily to augment in succeeding years. But of this, say three

per cent. should, with a view to safe management, be carried to a reserve fund against depreciation and renewals, leaving a clear dividend of 11 8-10ths per cent.

If to the first cost be added £24,000 for the supply of iron rails sufficient for heavy traffic, then upon the total cost of £98,400, the net return would be only 11 2-10ths per cent., from which deducting a reserve of three per cent. as before, a clear dividend of 8 2-10ths per cent. would remain.

§ 28. It may not be deemed altogether a departure from the proper object of this Report if a suggestion be offered as to the financial means of carrying the project into effect.

It is submitted, with deference, that the property of a well designed and judiciously managed Railway is not inferior to the best security which forms the basis of the present circulating medium of the country.

It is therefore suggested, that upon the engagement of an association formed for the construction and management of the Railway, to invest in the work a *bona fide* expenditure of one fourth of the whole estimated cost, such association might, with due security to the public, be endowed, under proper restraints, with the Banking privilege of issuing Notes, in payment of the remaining cost, in sums at no time exceeding the amount actually due and payable for work executed, and necessary charges and expenses-incurred.

Such notes would not less clearly be evidence of value than those which at present circulate as money. They would represent a property affording to every eye evidence of its capacity of redeeming and extinguishing such notes within a limited period, by either of two methods.

First—By setting apart annually from the gross revenue of the Railway, six per cent. upon the whole amount of such notes in circulation, for their progressive redemption and extinction within seventeen years.

Second—By receiving such notes in payment for shares in the Stock of the Association, upon a footing of equality with the original shareholders.

It may be objected that such notes in the meantime could not be readily converted into specie or bills of exchange for mercantile purposes.

It may be answered, that they would be at least as readily accepted as other notes in exchange for any of the staple products of the country, required for exportation, and therefore would not be less conducive to internal industry and domestic advancement.

If the capital necessary to the construction of the work were borrowed from non-residents, it would most probably become the medium of an undue importation of merchandise tending to repress rather than to promote domestic industry.

The measure proposed would be to borrow the resident skill and labour of the country in the form of a reproductive investment under competent and responsible direction, and in a manner adapted to inspire the energies of the whole community with a healthy and permanent activity, more independent than heretofore upon external vicissitudes.

This measure would also leave wholly unencumbered the available resources of the Province, so far as it might be deemed expedient to apply the same to the construction of the Trunk Line of Railway between Quebec and Halifax.

Should the proposed financial experiment, under proper guards and checks, subject to which only it should be tried, fail of success, the inconvenience would be limited. But should it be successful, it is submitted, that the lesson would be an important one to the future advancement of the Province.

I have the honor to be, Sir,

Your most obedient servant,

J. WILKINSON.

To the Hon. John R. Partelow, Provincial Secretary.

(A)

Tabular Statement of the Length, Cost, Receipts, Expenses, and Net Income of the principal Rail Roads in the State of New York, for 1845.

[From Appendix to a Report by A. C. Morton, Esquire, Chief Engineer of the Saint Lawrence and Atlantic Rail Road, 1846.]

NAME OF ROAD.	Length, in miles.	Total Cost.	Average cost per Mile.	Receipts.	Expenses.	Net Revenue.	Per cent. per annum on cost.	Per cent. of Receipts for Expenses.	REMARKS.
Utica and Schenectady,	78	£547,376	£7,017	£102,768	£36,889	£65,879	12	35.89	Single Track.
Utica and Syracuse,	53	279,218	5,268	50,596	18,750	31,846	11½	37.10	do.
Auburn and Syracuse,	26	192,068	7,387	24,950	11,081	13,869	7½	44.41	do.
Auburn and Rochester,	78	458,011	5,872	59,765	24,246	35,519	7½	40.56	do.
Tonawanda,	43½	187,763	4,316	23,167	9,251	19,916	10½	31.71	do.
Attica and Buffalo,	31½	85,500	2,736	17,574	7,743	9,831	11½	44.06	do.
Total,	309½	1,749,936	5,649	284,820	107,960	176,860	10	37.8	

All the above Roads, at the above date, were constructed with the Plate Rail, and were mostly single tracks. Aggregate length 309½ miles. Aggregate cost £1,749,936. Average cost £5,649 per mile. Total Net Revenue £176,860, equal to ten per cent. (nearly) on the aggregate cost. Total expenses £107,960, equal to 37 8-10ths per cent. of the gross receipts.

(B)

Tabular Statement of the Length, Cost, Receipts, Expenses and Net Income of the principal Rail Roads in the State of Massachusetts, for 1845.

(From Appendix to a Report by A. C. Morton, Esquire, Chief Engineer of the Saint Lawrence and Atlantic Rail Road, 1846.)

NAME OF ROAD.	Length, Miles.	Total Cost, Pounds.	Average Cost per Mile, Pounds.	Receipts, Pounds.	Expenses, Pounds.	Net Revenue, Pounds.	Per cent. per annum on cost.	Per cent. of Receipts for Expenses.	REMARKS.
Boston and Lowell,	25.75	483,149	18,763	89,017	44,760	44,257	9 2-10	50.28	Double Track.
Do. Maine,	71.00	471,832	6,645	71,766	38,524	33,242	7	53.68	Single do.
Do. Providence,	41.17	491,169	11,930	87,657	38,200	49,457	10	43.57	Do. do.
Eastern,	56.00	554,631	9,904	87,537	29,210	58,327	10 1-2	33.36	Do. do.
Boston and Worcester,	44.50	725,000	16,292	121,432	62,432	59,432	8 1-5	51.23	Double do.
Western,	156.00	1,999,888	12,819	203,370	110,714	92,656	4 2-3	54.43	Single do.
Fitchburg,	49.33	369,369	7,487	50,999	19,583	31,416	8 1-2	38.39	Do. do.
Nashua and Lowell,	14.25	125,600	8,772	28,170	12,000	16,170	12 7-8	42.60	2d track in progress.
New Bedford and Taunton,	20.00	113,405	5,670	19,552	7,346	12,206	10 3-4	37.56	Single Track.
Total,.....	478.00	5,333,443	9,788	759,932	362,769	397,163	7 44-100	47.75	

Aggregate length of all these Roads is 478 miles. Total cost is £5,333,443. Average cost reduced to a single Track is £9,728 per mile. Total Net Revenue is £397,163, equal to 7 44-100 per cent. on the total cost. Total expenses £362,769, equal to 47 75-100 per cent. on the gross receipts. All the above Roads have the H rail, varying in weight from 55 to 63lb per yard.

(C)

Abstract of the Registration of the number of Passengers at six Stations in New Brunswick, during three months in 1848.

Station at	FROM	Towards	In August.	In September.	In October.	TOTAL FOR	
						Three Months	One Year.
Spring Hill,	Woodstock,		2441	2179	2327	13,155	52,620
Do.	Fredericton,		2049	1984	2175		
Head of Petitcodiac,	Shediac, Richibucto, Miramichi.		2213	2312	2707	21,925	87,700
Do.	Sussex Vale, Saint John, Fredericton,		3071	3017	2659		
Do.	Dorchester, Sackville, Nova Scotia,		2091	2049	1806		
Hammond River,	Saint John,		1081	875	1055	5,842	23,368
Do.	Westmorland,		1023	858	950		
Tantamar Bridge,	Dorchester,		2758	2608	2363	15,413	61,652
Do.	Nova Scotia,		2720	2616	2348		
Lancaster,	Saint Andrews,		506	562	666	3,238	12,952
Do.	Saint John,		449	532	523		
Black River, (North,)	Chatham, Miramichi,		988	961	873	4,776	19,104
Do.	Richibucto,		662	638	654		
			22,052	21,191	21,106	64,349	257,396

55 ✓ ✓ ✓

(D)

Statement of several Railways in the United States having a realised Passenger Traffic below 80,000 persons per annum.

STATE.	Name of Railway.	Length in Miles.	Cost in Dols.	Cost per Mile, Halifax Currency.	No. of Passengers.		Fare per Mile.		Dividends 1847.
					1846.	1847.	In Cents.	In Pence Halifax Currency	
Virginia,	Petersburg,	63	946,721	£3,757	54,265	31,553	4.76	2.86	6½ per ct.
Ohio,	Little Miami,	84	1,325,933	3,946	19,783	178,342	2.3	1.42	8½ "
Ohio,	Mansfield and Sandusky,	56	808,560	3,610	32,383	220,737	2.67	1.6	"
North Carolina,	Wilmington and Raleigh,	167	1,800,000	2,695		38,393	4	2.4	"
Pennsylvania,	Harrisburg and Lancaster,	35½	860,000	6,037		57,786	4.1	2.46	"
New York,	Buffalo and Niagara Falls,	22	205,903	2,340		78,506	3.4	2.4	6½ "
New York,	Saratoga and Schenectady,	22	300,000	3,409		53,478	4	2.4	"
New York,	Schenectady and Troy,	20½	643,547	7,848		68,878	2.43	1.46	"
New York,	Rensselaer and Saratoga,	25	475,801	4,758		66,293	3.48	2.9	4½ "

(E)

Statement of the realised as compared with the estimated Traffic on several English Railways. Derived from recently published Statistical Returns.

NAME.	Length in Miles.	Estimated.		Realised in 1845.		Realised in 1846.		Realised in 1847.	
		Passen- gers.	Goods in Tons.	Passen- gers.	Goods in Tons.	Passen- gers.	Goods in Tons.	Passen- gers.	Goods in Tons.
Great Western, & Bristol, & Exeter,	231	821,145	209,563	1,993,088	209,563	2,757,193	300,000	2,876,922	371,326
Glasgow and Ayr.	19½	597,470	121,027	843,078	168,376	1,091,371	293,304	992,096	397,515
Lancaster and Preston,	20	106,937	..	135,344	26,099	162,012	25,585	106,475	22,054
Dundee and Arbroath,	16½	200,727	21,899	269,187	9,484	317,092	21,059	360,194	22,354
Sheffield and Manchester,	44½	335,444	84,050	1,168,448	32,000	1,604,227	135,000	1,569,707	218,740
London and South Eastern,	67	317,252	63,079	728,896	87,119	1,074,730	116,385	1,477,892	204,100
Total,	397½	2,378,995	529,618	..	..	..	..	..	..
Great North of England,	45	75,158	32,136	196,722	234,198	..	..	..	..
Total,	442½	2,454,153	561,754	5,334,763	888,839	7,006,625	891,333	7,382,586	1,236,089
Mean excess of realised traffic per cent.				117½	49½	197	68	210	133

71.000
57

(F)

INCREASE OF PASSENGERS BY THE ESTABLISHMENT OF RAILWAYS.

From Baron Charles Dupin's Report on the Paris and Orleans Railway.

"Experience has proved both in France and abroad, that in a short space of time the facility, expedition and economy afforded by Railways, more than doubles the number of passengers and the quantity of merchandize.

"In order to support such statements, we will quote the following facts relative to the Railways of Belgium, England and Scotland, in positions of extreme difference, and giving rise to a variation in the returns which far exceeded all anticipation :—

Comparison of the number of travellers conveyed daily throughout the whole or a portion of the Line :—

RAILWAYS.	No. of Passengers before the establishment.	No. of Passengers after the establishment.
Manchester and Liverpool,	400	1,620
Stockton and Darlington,	130	630
Newcastle and Carlisle,	90	500
Arbroath and Forfar,	20 ✓	200
Brussels and Antwerp,	200	3,000

Increase of the number of Passengers by the establishment of a Railway.

Liverpool and Manchester,	...	...	...	300 per cent.
Stockton and Darlington,	...	...	...	380 "
Newcastle and Carlisle,	...	...	...	455 "
Arbroath and Forfar, ...	...	...	...	900 "
Brussels and Antwerp,	...	...	...	1,400 "

"Thus even taking as a criterion the road on which the proportional is least of all, we still find that the number of passengers will increase not only 100, but 300 per cent. The transport of merchandize will experience a similarly rapid increase.

Progress in the conveyance by Railway of Merchandize compared to that of Passengers.

Year.	Passengers.	Tons.
1834	924,063	22,909
1836	1,248,552	161,501
1838	1,535,189	274,808

"Thus while the number of passengers increased 60 per cent. in four years, in the same time the quantity of goods increased 1100 per cent."

Extract of an Official Report on English Railways made to the French Government by Edward Teisserence, its Agent, charged with the special duty of making a study of these Railways :—

" The Darlington Railway has produced by its low rates of passage and freight, a complete revolution in the region of country which it traverses. It has increased the value of land 100 or 200 per cent. By these low rates the freight estimated at 80,000 tons has increased to 640,000 tons. The passengers estimated at 4,000 have increased to 200,000."

The following extract on the influence of Railways in developing the resources of a Country, is taken from the second Report of the Irish Railway Commissioners :—

" On the Newcastle and Carlisle Road, prior to the Railway, the whole number of persons the public coaches were licenced to carry in a week was 343, or both ways, 686. Now the average daily number of passengers by Railway for the whole length, viz. 61 8-10 miles, is 228, or 1596 per week."

(Note a.—This would be a realized passenger traffic of 82,992 for the year ; or nearly less by 5,000 than the common road traffic at the Bend of Petitedodiac.)

" The number of passengers on the Dundee and Newtyle line exceeds at this time 50,000 annually ; the estimated number of persons who performed the same journey previous to the opening of the Railway having been 4,000."

(Note b.—The realized traffic upon this Railway falls short of the existing common road travelling at three of the registered stations in New Brunswick.)

" Previous to the opening of the Railway between Liverpool and Manchester, there were about 400 passengers per day, or 146,000 per year, travelling between these places by coaches ; whereas the present number by Railway alone exceeds 500,000.

" In foreign countries the results arising from the same cause are equally if not more striking. The number of persons who usually passed between Brussels and Antwerp was 75,000 in the year ; but since the Rail Road has been opened from the former place to Malines, it has increased to 500,000 ; and since it was carried all through to Antwerp, the number has exceeded a million. The opening of a branch from Malines to Termonde appears to have added 200,000 to the latter number ; so that the passenger traffic of that Rail Road, superseding a road traffic of only 75,000 persons, now amounts to 1,200,000.

"It is remarkable that on this as on most other Rail Roads, the greatest number of passengers consists of those who travel short distances, being as two to one compared with those who go the whole distance. This appears from a statement read by Mr. Loch, before the Statistical Society at Manchester, shewing that between April 30 and August 15, 1836, 122,417 persons travelled the whole distance, and 244,834 short distances, chiefly to and from Malines."

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